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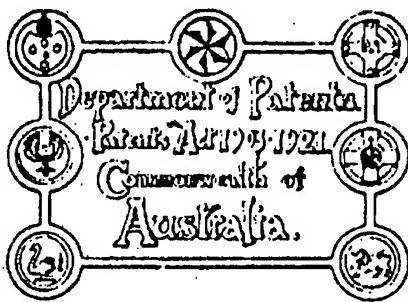
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No. 17,487/34.

APPLICATION DATED

8th May, 1934.

Applicant (Actual Inventor) ... Anxoln NESBITT MACNICOL.
Application and Provisional Specification Accepted, 15th June, 1934.
Complete Specification ... Accepted, 10th June, 1935.
Acceptance Advertised (Sec. 50) ... 20th June, 1935.

Class 12.3.

Drawing attached.

COMPLETE SPECIFICATION.

"Improved method of and apparatus for separating particles of different specific gravities and recovering those desired."

I, ANXOLN NESBITT MACNICOL, of No. 11 Phillip Street, Sydney, in the State of New South Wales and Commonwealth of Australia, Consulting Engineer, hereby declare this invention and the manner in which it is to be performed to be fully described and ascertained in and by the following statement:—

This invention relates to the separation of 10 particles of different specific gravities and recovery of those desired, and has been specially devised in order to provide an improved method of and apparatus whereby the desired particles whether the 15 heavier or lighter may be separated and recovered.

The improved method of separating particles of different specific gravities constituting finely ground material and recovering 20 those desired comprises the discharge of a mixture of material constituted of finely ground particles and a suitable liquid into a rapidly rotating vessel having a plurality of axially spaced and circumferentially 25 arranged and inwardly disposed riffles which may be in any convenient form such as, shoulders, ridges, grooves or channels, but preferably inwardly open recesses so that the heavier particles, such as gold, which attain 30 a higher velocity than lighter particles

during centrifugalization, will reach and lodge in or upon the riffles before the lighter particles, and then removing the lighter particles by discharging washing liquid, generally water, radially or at suitable angle or angles in the direction of the wall and riffles thereof to stir, diffuse and carry such particles from the vessel, and when the construction of the vessel is suitable, allowing the heavier particles to pass from the 10 recesses through the wall of the vessel into a receiver therefor.

The mixture of the material is made of finely ground particles and water as a liquid, but where required and or suitable according to the nature of the particles to be separated and to be recovered, the liquid may be water with its density increased by the addition of suitable substance or substances, such as salt, or natural salt water 20 may be used if readily available, or the liquid may be of a viscous nature, such as oil or glycerine, or of a lighter nature, such as benzine or alcohol, and when the nature of the particles is suitable, substances having 25 a selective affinity for desired particles may be added to the liquid, and when a collecting medium, such as mercury, is applied to the vessel, the liquid may have added thereto cleansing substances, such as acid, alkali, or 30

8 May.

garnaceous substances in order to obtain particles in the mixture to facilitate or promote their accretion by or amalgamation with the collecting medium; or suitable substance having dissolving effect may be added to the mixture to act upon the particles and dissolved material may be recovered later from the overflow.

United, the supply connection to the mix-
ture pipe may have therein a regulatable valve or control adapted and arranged to be automatically operated as desired, in order to the mixture may be inter-
mittent so that such mixture will be dis-
charged into the vessel intermittently or in pulses from said pipe, thereby to attain a

The improved apparatus according to this invention comprises a vessel whose depth or length is preferably greater than its diameter, which is adapted to be rapidly rotated upon its axis, which may be vertical or horizontal, or at any angle therebetween, and has a bottom in the manner of a flat wall, a plurality of axially-spaced and circumferentially arranged inwardly-dropped flutes, preferably in the form of inwardly open recesses either formed integral therewith or in empiceable and removable rings to fit into channels provided therefor, and each of the recesses being having when suitable to the heavier particles to be separated according to the nature and presence thereof in the material an escape or discharge through the vessel wall, preferably from the deepest position of the recess, so that such particles, 10 pulsatory effect in the mixture in the vessel to assist in or maintain the diffusion of the particles and thus facilitate their separation. A dredge rod a series of the vessels may be arranged preferably at different levels, and each be provided with a chute thereabout to receive the overflow therefrom and convey 15 to the next vessel, and from the last vessel suitable latrider so that after settl- 20 ment therein the liquid may be withdrawn for further use or to waste, and any remaining particles be recovered. 25 And in order that the invention and practical applications thereof may be readily understood the same will now be described with reference to the accompanying draw- 30 ings, in which Fig. 1 is a sectional elevation of the improved apparatus.

which are inclinedly reduced from the corner of the trailing side wall 23 and the back of the top wall 24, where they are deepest, to the front edge 26 and the opposite side edge 27 which is the top of the trailing wall 23 of the next recess, and at the deepest position of each there is a small escape orifice 25 through the wall of the vessel. In order that all such orifices may be closed and opened as desired, the outer face of the wall of the vessel is formed with a flat 28 theron, and a slideable cover ring 29 operable by convenient means such as a arm 33 upon a bar 31 which may be moved by any suitable means, not shown, are provided. When it is desired to screen and uncover said orifices the ring may be provided with holes therethrough to juxtapose with the orifices 25, though they may be 20 larger, and be covered with suitable filtering and/or straining material.

To facilitate manufacture of the vessel and/or the removal of contents of the recesses 19 same are formed in a separate ring 32 which may be in sections and a channel 33 be formed in the vessel wall to receive said ring 32 which would be provided with a socket or sockets 34 to engage a pin or pins 35 in the channel 33 to assure 30 juxtaposition of the orifices 25 and orifices 36 through the wall.

Inside the vessel are supply and discharge pipes, one for the mixture and others for washing liquid, which may conveniently be concentric pipes, an inner one 37 and an outer one 38, both adapted to be connected to supply and to be rotated, though if desired, they may be stationary. The former 37 for connection to mixture supply and having an enlargement or chamber 39 on its inner end with a plurality of peripherally spaced discharge openings disposed at suitable angles or angles, such as vertical narrow slots 40 through the vertical wall 41 and the outer pipe 38 terminating at the

irrespective of the mixture pipe, at 1 a plurality thereof may be positioned at circumferentially spaced positions in the vessel.

In the modified construction as in Figure 6, about the escape orifices 36 through the wall of the vessel is a discharge retarding 6 through 42 to retard the discharge from the orifices.

The rilles 21 in the wall of the vessel 10 may be formed as in Figure 4 with an inward projection 43 to provide a flat 44, a slight recess 45 at the outer end of the flat 44 and an inward slope 46 from said recess 45 to the next projection 43, or as in Figure 6 the rilles 22 are formed above 16 outwardly and upwardly spaced or stepped 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 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and/or metal in solution; or to a laundromat for washment and thereafter gathering of such particles.

Having now fully described and ascertained my said invention and the manner in which it is to be performed, I do testify that what I claim is —

1. Improved method of separating particles of different specific gravities and recovering those desired, consisting in the centrifugalization of a mixture of such particles and liquid discharged into a rapidly rotated vessel towards its wall which is adapted to receive and retain the heavier particles and discharging washing liquid into the mixture in said vessel to cause agitation therein and separation and/or diffusion of the lighter particles so that said particles will be carried off in the overflow from said vessel.

2 Improved method of separating particles of different specific gravities and recovering those desired, consisting in discharging a mixture of the particles and liquid towards the wall of a gradually constricted vessel which is adapted to receive and retain the heavier particles and dis-turbing and diffusing the lighter particles in the mixture by discharging a wash-ing liquid into the mixture at desired pressure at any desired angle towards said wall and allowing said lighter particles to be carried off in the overflow from said vessel.

35. Improved method of separating particles of different specific gravities and recovering the same described in Claims 1 and 2, in which the mixture is discharged into the vessel intermittently to give a pulsatory effect therein.

40. 4. Improved method of separating parallel layers of different specific gravities and recovering those desired as in Claim 1 and 2, in which the density of the liquid forming the mixture is increased by the addition of suitable substances or substances.

45. 5. Improved method of separating parallel layers of different specific gravities and recovering those desired as in Claim 1 and 2, in which the density of the liquid forming the mixture is increased by the addition of suitable substances or substances.

process of separating the liquid from the solid, recovering those derived as in Claim 1, and in which the liquid forming the mixture is 50% or of a viscous nature.

4. Improved method of separating particles of different specific gravities and recovering those desired as in Claims 1 and 2, in which the liquid forming the mixture

It is of a light nature, such as benzine or alcohol.

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7. Improved method of separating particles of different specific gravities and recovering those desired as in Claims 1 and 2, in which ingredients having an affinity for some of the particles to be separated are added to the liquid forming the mixture.

5 Improved method of separating
particles of different specific gravities and
recovering those desired as in Claims 1 and
2, in which ingredients having a cleansing
and/or dissolving effect upon particles, or
some of them, in the mixture are added to
said mixture.

or improved method of separating particles of different specific gravities and recovering those desired as in Claims 1 and 2, in which the vessel is first supplied with a collecting medium, such as mercury.

10. Improved method of separating particles of different specific gravities and recovering those desired, substantially as described and explained. 20

11. Improved apparatus for separating particles of different specific gravities and recovering those desired, comprising a rotatable vessel having a plurality of axially spaced and circumferentially arranged riffles upon the inner face of its wall, and mixture supply and washing liquid supply pipes inside said vessel respectively adapted to discharge mixture and a washing liquid at desired angle or angles towards the wall of said vessel.

12. Improved apparatus for separating
particles of different specific gravities and 35
thereby isolating those desired as in Claim 11, in
which the vessel has ribs, corrugations or
flutings of the like between the axially
spaced rifles and disposed at an angle or
angle leading to said rifles. 40

13. Improved apparatus for separating particles of different specific gravities and recovering those desired as in Claim 11, in which the rilles are in the form of inwardly disposed projections with an 13.

14. Improved apparatus for generating 50

particles of different specific gravities and recovering those desired (as in Claim 11) in which the times are formed above upwardly spaced and outwardly stepped channels.

15. Improved apparatus for separating 50 particles of different specific gravities and

recovering those desired as in Claim 11, in which the riffles are in the form of upwardly or forwardly slant and downwardly or rearwardly sloped projections.

8. Improved apparatus for separating particles of different specific gravities and recovering those desired as in Claim 11, in which the riffles are in the form of a plurality of circumferentially divided inwardly open and rearwardly deepened recesses.

17. Improved apparatus for separating particles of different specific gravities and recovering those desired as in Claim 11, in which the riffles are in the form of inwardly open recesses in the wall of the vessel and are inwardly deepened to an extent visible through said wall.

18. Improved apparatus for separating particles of different specific gravities and recovering those desired as in Claims 11 and 17, in which means are provided for closing or screening and opening or uncovering the outer ends of the escape orifices.

19. Improved apparatus for separating particles of different specific gravities and recovering those desired as in Claims 11 and 17, in which a discharge retarding trough is formed upon or with the wall of the vessel about the outer ends of the escape orifices.

20. Improved apparatus for separating particles of different specific gravities and recovering those desired, comprising the

combination and arrangement of the integers substantially as described and explained with reference to Figure 1 of the drawings.

21. Improved apparatus for separating particles of different specific gravities and recovering those desired, comprising the combination and arrangement with the other main integers as described, of a vessel having the riffles formed with the wall substantially as described and explained with reference to Figure 4 of the drawings.

22. Improved apparatus for separating particles of different specific gravities and recovering those desired, comprising the combination and arrangement with the other main integers as described, of a vessel having the riffles formed with the wall substantially as described and explained with reference to Figure 5 of the drawings.

23. Improved apparatus for separating particles of different specific gravities and recovering those desired, comprising the combination and arrangement with the other main integers as described, of a vessel having the riffles formed with the wall substantially as described and explained with reference to Figure 6 of the drawings.

Dated the sixth day of March, A.D. 1935.

ALFRED NICHOLAS MACNICOL.

30

By his Patent Attorney,

PERCY NEWELL.

Witness—Graham Newell.

